LONG TERM STEWARDSHIP
DECISION MAKING AND INSTITUTIONAL PERFORMANCE
January 21-22, 2002
Dallas, Texas

Flip Chart Notes

1. Vision statement discussion

By 2008 need to develop R&D that will permit the following:

Incentives for good decision making have been started to be institutionalized.

All sites have a plan for stewardship.

A process that helps to determine if a change in a decision is needed as research comes in.

Flexible.

Iterative.

Adaptive.

Admit mistakes.

It should tell where the contamination is or that we don't know where it is.

Should tell us (stakeholders) what we know.

Decisions based on what is right to do for future generations not just responding to regulatory failure.

Pathways to institutional failure are understood.

Legitimize the sociopolitical process.

Stable and Sustained funding systems.

Open and transparent.

2. Draft vision statement

By 2008, need research to develop a process that will begin the institutionalization of a process that is open, flexible, iterative and adaptive and that results in a legit ament, stable and sustained sociopolitical performance.

3. Bill's summary flip chart.

Research well under way* to identify:

- Major forms/pathways of institutional failure (and success?).[1] ✓
- Sustainable/reliable funding/oversight mechanisms. ✓
- Promising approaches for adaptation/improvements. ✓
- Major sources-of/impediments-to legitimacy/credibility. ✓
- Factors/forms of improved institutional reliability/performance. ✓
- Better ways to document, retain and communicate information to current and future generations. ✓

Systems being developed* to:

[1] Check mark indicates the team believed the idea was adequately incorporated in the final activity/capability list included in the Excel spreadsheet.

- Provide reasonably full disclosure on: decision process, removing hazards, intended future reconsideration.
- Assure rapid information transfer to, and practical use by, DOE site and headquarters.
- Permit/encourage promising experimentation.
- Improve/permit management adaptation to identify/correct failures, and to identify/adapt improvements.
- Account for intergenerational tradeoffs.

4. Activities/capabilities sheet 1

Activity 1 - Control exposure to hazards

- Early warning based on "near miss". ✓
- Passive long-term warning (orange barrier).
- Insure institutions remain alert and respond.
- Prevent new contamination. ✓
- Process for reconsidering more permanent cleanup options in the future. ✓

Activity 4 - Document, retain and communicate information (i.e. knowledge management).

- Process to identify the necessary information. ✓
- Retaining the necessary information. ✓
- What information, but also what modes of information communication. ✓
- What people might want/need what information. ✓

Put in place process for decision making performance for Long-term stewardship.

- Different type of decision processes.
- Who should be at the table.
- Graded approach to decision making.
  [The graded approach idea was moved under Activity 3 in the final list.]
- Learn how to combine flexibility in the face of uncertainty.

5. Activities/capabilities sheet 2

Activity 2 - Develop improved institutions for long-term stewardship (reliability and constancy).

- Funding.
- Incentives.
- Institutional culture.
- Scan the environment outside the site.
- Graded decision making process (not one size fits all, but conditions under which) ✓
- Explore/develop performance measures.

Activity 3 - Improve ability to learn from mistakes

- Ongoing self-assessments.
- Decision making process?
- How to improve performance (actually do reconsider).

6. Activities/capabilities sheet 3

Develop performance measures on organizations and activities.

- Incorporate unknowns as they occur.
- Foster greater imagination for potentials for failure.
- Risk based performance or based on the right thing to do.
- Identify performance measures.

Activity 5 - Improve institutional credibility and community interaction.

- Identify the appropriate information.

Ability to learn.

7. Activities/capabilities sheet 4

Potential capabilities for Activity 4.

- Logical process for identifying necessary information.
- Template to identify information for current and future generations.
- Communicating information in appropriate format for various audiences and why (context).
- Data retrieval and display.

Potential capabilities for Activity 1.

- Assessing performance.
- Preventing new contamination.
- Integrated Safety Management System (ISMS) (adaptive management).
- Reconsidering more permanent options.
- Learning more about scope and nature.

8. Activities/capabilities sheet 5.

Develop ability to learn from our mistakes and others mistakes.

- Implementing corrective actions or systems that work better. ✓
  [The implementing corrective actions idea was moved under the final Activity 3.]
- Ability to implement necessary change.

9. General comments

Need a robust program of research and development.

Need incremental improvement.

Need a change in paradigm.

10. Issues/Concerns/Opportunities

The vision statement drafted by this team at this workshop is not for public distribution.

Social Science Research and Development should be managed by social scientists not by engineers.

Many of the impacts on capabilities do not occur until 1008 and beyond, but in order for these impacts to be realized the research needs to start NOW.

Capability 2.2 should be considered for merging with capability 2.3 by this workgroup at a future meeting or teleconference.

The roadmapping grading process (impact and status) is subjective and judgmental because there is no common metric.

Responsible WG Member Liz Hocking

SS&IC - LTS S&T Roadmap Target Form

Program Activity: Improve ability to learn from mistakes and to adopt improvement.

Technical Capability: Identify conditions under which physical and land/use controls do or don't remain effective and why.

Goal: [ ] Reduce Cost [H] Reduce Uncertainty [ ] Reduce Risk

Short-term(2008) Target: Have identified the range of potential controls and how they have worked and why.

Target Description: Conduct research on the following conditions and characteristics of land use controls in use now – successfully or not – at several varied sites:

- The bases upon which land use controls were selected for incorporation into the remediation remedy
- The degree of analysis that went into their selection and design
- Who was involved in their selection and design
- The institutional, functional and legal structures that were in place to support the land use controls
- The institutional, functional and legal structures that had to be developed to support the land use controls
- Public and regulator acceptance of the land use controls and the systems put in place to support them
- The allocation of authority and responsibility for monitoring the land use controls, assessing their performance, and enforcing them
- The incentives and sanctions associated with an organization's responsibility for the land use control
- The protocols for assessing their effectiveness.

Target Status: [ ] Process/Method Exists [X] Process/Method Being Pursued [ ] No Known Process/Method

Status Justification: All sites with residual contamination will rely on land use controls to limit use of or access to the contaminated resources on the site for as long as the site contaminants pose a potential risk. The literature and common sense indicate that there is a high probability that the land use controls will fail through time due to human error, loss of information, or loss of interest in maintaining them. The conditions that could forestall those failures need to be understood better and factored into land use control selection and implementation.

Mid-term(2014) Target:

Target Description:

Target Status: [ ] Process/Method Exists [ ] Process/Method Being Pursued [ ] No Known Process/Method

Status Justification:

Long-term(2020) Target:

Target Description:

Target Status: [ ] Process/Method Exists [ ] Process/Method Being Pursued [ ] No Known Process/Method

Status Justification:

Elevator Speech for Capability 3.2: Identify conditions under which physical and land/use controls do or don't remain effective, and why

Physical and land/use controls (hereinafter, land use controls) are the systems put in place to ban or restrict human access to or use of resources with residual contamination. The term includes institutional controls (mechanisms that have a legal basis such as deed restrictions, zoning, permit programs), barriers (fences and gates), and notification or education systems (e.g., signs, public awareness programs, fish consumption advisories, museums).

The literature on physical and land/use controls is replete with analyses of their limitations and how they can fail and examples of how they have failed.

What is lacking is research resulting in a more thorough understanding of the following conditions and characteristics that could affect the success or failure of land use controls:

- The bases upon which land use controls were selected for incorporation into the remediation remedy;
- The degree of analysis that went into their selection and design;
- Who was involved in their selection and design;
- The institutional, financial, and legal structures that were in place to support the land use controls;
- The institutional, financial, and legal structures that had to be developed to support the land use controls;
- Public and regulator acceptance of the land use controls and the systems put in place to support them;
- The allocation of authority and responsibility for monitoring the land use controls, assessing their performance, and enforcing them;
- The incentives and sanctions associated with an organization's responsibility for the land use control; and
- The protocols for assessing their effectiveness.

Filename: Elevator-LUCs
Author: Liz Hocking
Date: 17 February 2002

Responsible WG Member Liz Hocking

SS&IC - LTS S&T Roadmap Target Form

Program Activity: Develop improved reliability/consistency in LTS institutions.

Technical Capability: Sustainable and adequate funding.

Goal: [ ] Reduce Cost [H] Reduce Uncertainty [H] Reduce Risk

Short-term(2008) Target: Initial case studies finished and reviewed/synthesized by experts, with potentially promising options beginning field-testing.

Target Description:: Complete research on the objectives, structures, and effectiveness of the following possible Funding mechanisms:

- Federal trust funds (e.g., Nuclear Waste Fund, Highway Trust Fund, Superfund)
- Federal organizations responsible for maintaining control and oversight of land and its uses (e.g., Fish and Wildlife Service, Bureau of Reclamation)
- Public Enterprises (e.g., Postal Service, Resolution Trust Corporation)
- Quasi-public organizations (e.g., metropolitan transportation authorities)
- Insurance tools
- Annual congressional appropriations (e.g., appropriations history for existing federal organization responsible for maintaining control and oversight of land and its uses (e.g., Fish and Wildlife Service, Bureau of Reclamation)

Target Status: [ ] Process/Method Exists [X] Process/Method Being Pursued [ ] No Known Process/Method

Status Justification: Uncertainty and the potential risk at sites with residual contamination can only be reduced through periodic assessments of the contaminants and the systems in place to contain them or restrict access to them. The monitoring and information management activities necessary to support these assessments are supported, in turn, by an organizational system of personnel, policies, and methodologies. The organizational system requires adequate and sustained funding to complete these activities through time.

Mid-term(2014) Target:

Target Description:

Target Status: [ ] Process/Method Exists [ ] Process/Method Being Pursued [ ] No Known Process/Method

Status Justification:

Long-term(2020) Target:

Target Description:

Target Status: [ ] Process/Method Exists [ ] Process/Method Being Pursued [ ] No Known Process/Method

Status Justification:

Elevator Speech for Capability 2.1: Sustainable and Adequate Funding

Sustained and adequate funding is necessary in order that the appropriate personnel, policies, and methodologies are in place to ensure that the following long-term risk management activities can be effectively completed:

- Monitoring the performance of containment systems (e.g., cells, caps, tanks, monitored natural attenuation), determining the need for modification of the systems, and acting on those determinations;
- Monitoring the characteristics of site contaminants (e.g., their mobility, movement, decay, concentrations), assessing their impacts on remedy effectiveness, and taking appropriate action to modify the remedy;
- Monitoring site and off-site characteristics that could affect the stability of the site remediation remedy, evaluating their impacts on remedy effectiveness, and taking appropriate action to modify the remedy; and
- Assembling, maintaining, and disseminating the site and contaminant data necessary to demonstrate the successful operation of the remedy or the basis for remedy modification or termination.

Initial research has been done by Resources for the Future (2000) on the effectiveness of trusts to provide sustainable and adequate funding. The Department of Energy (2001) has done basic assessments of the strengths and weaknesses of a variety of funding mechanisms. These studies were not meant to be exhaustive but they provide groundwork for more detailed research into the mechanisms for sustained and adequate funding.

Thorough research is warranted on the objectives, structures, and effectiveness of the following possible funding mechanisms:

- federal trust funds (e.g., Nuclear Waste Fund, Highway Trust Fund, Superfund);
- federal organizations responsible for maintaining control and oversight of land and its uses (e.g., Fish and Wildlife Service, Bureau of Reclamation);
- public enterprises (e.g., Postal Service, Resolution Trust Corporation);
- quasi-public organizations (e.g., metropolitan transportation authorities)
- insurance tools; and
- annual congressional appropriations (e.g., appropriations history for existing federal organizations responsible for maintaining control and oversight of land and its uses (e.g., Fish and Wildlife Service, Bureau of Reclamation).

Filename: Elevator-funding
Author: Liz Hocking
Date: 17 Feb 2002

Responsible WG Member D. Griswold

SS&IC - LTS S&T Roadmap Target Form

Program Activity: Document, retain, and communicate information.

Technical Capability: Developing improved capabilities for information retention, retrieval, and display.

Goal: [ ] Reduce Cost [X] Reduce Uncertainty [ ] Reduce Risk

Short-term(2008) Target: DOE has an effective LTS information management system.

Target Description: Complete research is to develop:

- A logical process for identifying and retaining the necessary information
- An approach for identifying information for current and future generations, and who might want that information.
- A method of communicating information in the appropriate format to various audiences that includes why DOE believes the information to be important.
- Sustainable systems for data retrieval and display.

Target Status: [ ] Process/Method Exists [X] Process/Method Being Pursued [ ] No Known Process/Method

Status Justification: In *Long-Term Stewardship and the Nuclear Weapons Complex: The Challenge Ahead, Resources for the Future* stated information management systems "should be organic system that can accommodate the addition of relevant new information, that can adapt over time according to external circumstances, that can compensate for failure of the media on which information is stored, and that can easily accessed by future generations." The National Research Council provided a lengthy list of the capabilities necessary for even a minimal system; the information will need to be information about the nature, extent, and duration of risks from residual contamination, contaminant reduction and isolation efforts on the site, monitoring data associated with these efforts, use restrictions in place, and information about the entities responsible for implementing, overseeing, enforcing, and modifying the site's long-term management plan. A system that can achieve all of these requirements is not currently available. ICF Kaiser, funded by DOE, produced a report on the significance of the LTS information management issue, which listed numerous findings that indicate adequate systems are not currently in place. Some elements of the required information systems are available, and many are currently being studied, but there are aspects of the system that are not being pursued, and there is currently no unified approach to a comprehensive system. *This has not been vetted.*

Mid-term(2014) Target:

Target Description:

Target Status: [ ] Process/Method Exists [ ] Process/Method Being Pursued [ ] No Known Process/Method

Status Justification:

Long-term(2020) Target:

Target Description:

Target Status: [ ] Process/Method Exists [ ] Process/Method Being Pursued [ ] No Known Process/Method

Status Justification:

Elevator Speech; Capability 4.2 – Developing Improved Capabilities For Information Retention, Retrieval And Display

The Department of Energy (DOE) and external organizations have identified management of information as a key element to the successful implementation of long-term stewardship (LTS). Resources for the Future stated information management systems will have to be capable of storing and preserving historical information, while integrating new information (1). The National Research Council provided a lengthy list of the capabilities necessary for even an minimal system; the information will need to be informative about the nature, extent, and duration of risks from residual contamination, contaminant reduction and isolation efforts on the site, monitoring data associated with these efforts, use restrictions in place, and information about the entities responsible for implementing overseeing, enforcing and modifying the site's long-term management plan (2). ICF Kaiser through funding by DOE produced a report on the significance of the LTS information management issue, and found the following (3):

1. Most types of information needed for LTS are already being generated for other purposes.
2. Requirements do not specifically identify what constitutes stewardship data or how to define this discrete subset.
3. Information management requirements and practices are not coordinated with property transfer requirements.
4. Information that has stewardship value is being lost, destroyed, or maintained in formats that may not be useful to future stewards.
5. Some data will not be preserved as long as necessary for stewardship purposes.
6. Some date will be preserved adequately but may not be able to be located, or will not be accompanied by enough descriptive information to be usable.
7. Most records of facilities and site infrastructure are required to be destroyed when facilities are demolished or infrastructure is declared obsolete.
8. DOE has already begun to pay increased cleanup costs because critical data have been lost.
9. Knowledge that archived information about DOE sites exists but may be lost.
10. Future users may not know where to search for all relevant information, causing delays in action or the potential for unnecessary risk.
11. Even when such knowledge is preserved, and users know where information is located, it may take too long or be too expensive to gain access to stewardship data.

To successfully implement LTS, DOE must have in place and effective information management system. To accomplish this goal research is needed to develop:

- A logical process for identifying and retaining the necessary information.
- An approach for identifying information for current and future generations, and who might want that information.
- A method of communicating information in the appropriate format to various audiences that includes why DOE believes the information to be important.
- Sustainable systems for data retrieval and display.

References Cited

1 Probst, K. N. and M. H. McGovern, 1998. Long-Term Stewardship and the Nuclear Weapons Complex: The Challenge Ahead. Center for Risk Management. Resources for the Future, Washington DC. 67 pp.

2 National Research Council, 2000. Long-Term Institutional Management of U.S. Department of Energy Legacy Waste Sites. Committee on Remediation of Buried and Tank Wastes, National Academy Press, Washington, D.C. 164 pp.

3 ICF Kaiser, 1998. Managing Data for Long-Term Stewardship. Working Draft.

Responsible WG Member Tom Marshall

SS&IC - LTS S&T Roadmap Target Form

Program Activity: Improve institutional credibility and community interaction.

Technical Capability: Learning what effects public trust and confidence.

Goal: [X] Reduce Cost [ ] Reduce Uncertainty [ ] Reduce Risk

Short-term(2008) Target: Initial case studies finished to determine what engenders public confidence and trust.

Target Description: Research is needed to determine:

- What engenders public trust and confidence, and the effect on public policy;
- What effective public participation looks like, including further examination of the analytic-deliberative process;
- How to measure effective public participation;
- How to replicate successful public participation efforts.

Research should include case studies of processes and actions that were deemed to engender public trust and confidence and their affect on public policy, case studies of public participation efforts inside and outside of DOE, pilot public participation efforts in long-term stewardship, and analysis and suggestions for replication of practices deemed successful.

Target Status: [ ] Process/Method Exists [ ] Process/Method Being Pursued [X] Very Little ~~No~~ Known Process/Method

Status Justification: It is widely held that public participation in decisions involving risk and uncertainty is necessary if decision-makers are to gain public confidence and trust. The National Research Council in its 1996 report, Understanding Risk: Informing Decisions in a Democratic Society, argued that involving all interests at the very beginning of risk decisions in in both the characterization and analysis of the risk, and in a substantive, iterative process will help to achieve better decisions. While there is some research into what constitutes effective public participation this research is limited. Research into measuring the effect of public participation on public trust and confidence, and on public policy is limited.

Mid-term(2014) Target:

Target Description:

Target Status: [ ] Process/Method Exists [ ] Process/Method Being Pursued [ ] No Known Process/Method

Status Justification:

Long-term(2020) Target:

Target Description:

Target Status: [ ] Process/Method Exists [ ] Process/Method Being Pursued [ ] No Known Process/Method

Status Justification:

Elevator Speech
5.1 - Learning What Affects Public Trust and Confidence

The Department of Energy (DOE) has a long standing lack of credibility when it comes to cleanup of the nuclear weapons complex. Charges of untrustworthiness, incompetence, and conflict of interest emanate from the private sector, the media, government leaders and regulators, and the public interest community. In fact the Environmental Management program in a recently released report (DOE, "Top-to-Bottom Review" 2001) stated that over the last ten years of the program there has been little substantive progress to report. This same Department is charged with developing and at least beginning the implementation of a long-term stewardship program at sites across the nation where cleanup efforts fail to result in free release conditions.

The development of viable long-term stewardship program will require that communities have a high degree of trust and confidence in those entities charged with designing and administering this program. The National Research Council in its 2001 report to DOE on long-term stewardship said to expect failure, that DOE should plan for uncertainty and fallibility. Given this prognosis, DOE and other potential stewards have little room for error. Seemingly, a cooperative relationship with communities around DOE sites and with the public nationally will enhance chances for success.

Passive lack of public support or an adversarial relationship with the public could spell disaster for the creation of a viable long-term stewardship program. Consider some of the potential obstacles that may arise if DOE and other potential stewards fail to gain support for a long-term stewardship program:

- DOE could find itself mired in litigation. DOE has already been sued repeatedly over its Environmental Management program. A public that believes that DOE is trying to walk away from cleanup commitments may turn to this tool.
- No constituency for funding for long-term stewardship. Obtaining such funding will be an uphill battle even with public support. Lacking public support this may be a pipe dream.
- Absent trust in DOE as a long-term steward, communities will be less likely to accept DOE leaving residual contamination at sites and will fight this every step of the way.
- A worst case scenario is that there is a complete log jam, the Environmental Management Program is completely inoperable, and Congress orders an "iron fence" cleanup.

However, should public trust and confidence be engendered the chance for success increases. Further, DOE will likely realize both short-term and near-term cost savings as a result of a cooperative relationship with the public. In such a situation communities will be more likely to try innovative approaches to cleanup.

It is generally accepted that involvement of the public in difficult public policy decisions helps to engender public trust and confidence. A public that feels cut out of such a process is more likely to turn hostile (the Federal Facilities Environmental Restoration Dialogue Committee's advocacy of site specific advisory boards in the face of funding

shortfalls is a good example). A 1996 report by the National Research Council (Understanding Risk: Informing Decisions in a Democratic Society) argues that better decisions are made and controversies around risk decisions are better resolved when all interested and affected parties are involved at the earliest possible point in both the characterization and the analysis of risk. The report advocates an analytic-deliberative process which is truly substantive public participation process involving the range of interested and affected parties, decision makers, and technical specialists.

There is large body of literature regarding effective public participation in decision-making, however, very little knowledge about how to measure the effectiveness of such participation. However, public participation around DOE sites has met with mixed results.

Research is needed to determine:

- What engenders public trust and confidence;
- What effective public participation looks like, including further examination of the analytic-deliberative process;
- How to measure effective public participation;
- How to replicate successful public participation efforts.

Research should include case studies of public participation efforts inside and outside of DOE, pilot public participation efforts in long-term stewardship, and analysis and suggestions for replication of practices deemed successful.

Responsible WG Member Tom Marshall

Responsible WG Member Tom Marshall

SS&IC - LTS S&T Roadmap Target Form

Program Activity: Improve institutional credibility and community interaction.

Technical Capability: Involving community in conduct of stewardship.

Goal: [X] Reduce Cost [ ] Reduce Uncertainty [X] Reduce Risk

Short-term(2008) Target: Determine what constitutes effective involvement at reducing risk and cost and pilot studies underway at selected sites.

Target Description: Research is needed to determine:

- The degree to which community involvement in the conduct of long-term stewardship enhances the success of such a program.
- The degree to which community involvement reduces risk and short-term and long-term costs.

Research should involve analysis of community involvement in long-term stewardship to date, case studies of successful public participation activities inside and outside of DOE, pilot studies of community involvement in the conduct of long-term stewardship, and recommendations for replicating efforts that are deemed successful.

Target Status: [ ] Process/Method Exists [X] Process/Method Being Pursued [ ] ~~No~~ Very Little Known Process/Method

Status Justification: There have been concerted public participation efforts around DOE's Environmental Management program for the last ten years with mixed results. Community working groups, Site Specific Advisory Boards, and local governments have demonstrated active interest in long-term stewardship. There is a beginning body of literature on measuring the effectiveness of public participation.

Mid-term(2014) Target:

Target Description:

Target Status: [ ] Process/Method Exists [ ] Process/Method Being Pursued [ ] No Known Process/Method

Status Justification:

Long-term(2020) Target:

Target Description:

Target Status: [ ] Process/Method Exists [ ] Process/Method Being Pursued [ ] No Known Process/Method

Status Justification:

Elevator Speech
Capability 5.3 - Involving Community in the Conduct of Stewardship

At more than one hundred Department of Energy (DOE) sites, currently anticipated cleanup efforts will leave radioactive and chemically hazardous contamination behind. In some cases dump sites with concentrations of these materials will exist (some special dump sites such as WIPP will be created). The activities required to protect human health and the environment over the dangerous life of these often long-lived contaminants are generally defined as long-term stewardship. These activities include creation and maintenance: of engineered controls, appropriate institutions, legal and administrative mechanisms. It will also require the documentation and storage of information, and transmission of that information through time.

Asking communities to accept incomplete cleanups that can threaten the health of current and future residents, threaten ecological resources, and have negative economic impacts is asking a lot. Complicating this is that DOE has had a long standing lack of credibility with many community members, regulators, and elected government officials. Substantive community involvement in the design and conduct of long-term stewardship plans and activities may help to build the credibility of institutions responsible for long-term stewardship, and may result in a cleanup/long-term stewardship program that reduces environmental and health risks in the near and long-term.

The DOE Environmental Management program has recently raised the prospect that long-term stewardship responsibilities might be transferred to other entities once near-term end-states have been achieved. Even if this does not occur, DOE presence at and attention to such sites is likely to diminish significantly. Thus, the importance of local involvement, knowledge of, and ownership of long-term stewardship is all the more important. Local communities that are well versed in the problems that exist at sites, the remedies in place for addressing these problems, the mechanisms in place for maintaining and evaluating these remedies, and information management will better be able to ensure the continuity of a viable long-term stewardship program. By including communities (members of the public, public interest organizations, advisory boards, and local governments, etc.) as true partners in the design and conduct of long-term stewardship the negative effects of inevitable governmental and administrative changes will be significantly lessened.

Substantive community involvement in the design and conduct of long-term stewardship may also result in significant cost savings. The National Research Council in recent report to DOE recommends that to address the risks and uncertainties of long-term stewardship, a systematic approach to cleanup be developed in which contaminant reduction, contaminant isolation, and stewardship are considered in an integrated and complementary fashion (NRC 2001). If it is accepted that long-term stewardship begins with future site-use, end-state, and remedy determinations then the potential for near-term and long-term cost savings are great. Community involvement in cleanup decisions to date have resulted in in millions of dollars of savings to DOE. At times the identification and advocacy of these cost savings has been initiated by local communities (e.g. Hanford

and Rocky Flats). In some instances short-term cost savings by over reliance on engineered or institutional now may result in larger costs over time resulting from monitoring, maintenance, and work re-done due to remedy failure. Communities are likely to be vigilant in this respect. An example of this is contained in a report by the by the Rocky Flats Stewardship Working Group which presents a "toolbox" that helps to "identify and organize the long-term activities necessary for stewardship program so they may be considered in remedy selection decisions." (Rocky Flats Stewardship Working Group, "Hand-in-Hand: Stewardship and Cleanup" 2001).

The public has already demonstrated leadership in the area of long-term stewardship. Working groups in several communities have studied the issue and produced very good reports. The Site Specific Advisory Boards have held two national meetings on long-term stewardship and issued recommendations. The Energy Communities Alliance, a national alliance representing local governments issued a report in conjunction with the Environmental Law Institute on the role of local governments in long-term stewardship.

Research is needed to determine:

- The degree to which community involvement in the conduct of long-term stewardship enhances the success of such a program.
- The degree to which it reduces risk and short-term and long-term costs.

Research should involve analysis of community involvement in long-term stewardship to date, case studies of successful public participation activities inside and outside of DOE, pilot studies of community involvement in the conduct of long-term stewardship, and recommendations for replicating efforts that are deemed successful.

Responsible WG Member Tom Marshall

Responsible WG Member Lee Clarkl

SS&IC - LTS S&T Roadmap Target Form

Program Activity: Develop improved reliability/constancy in long term stewardship institutions

Technical Capability: Identify major forms or pathways of institutional failure/success in order to improve institutional reliability performance

Goal: [ ] Reduce Cost [X] Reduce Uncertainty [ ] Reduce Risk

Short-term(2008) Target: Research findings reasonably well developed and the steward has begun to take them into account

Target Description: Complete case studies on a wide range of case studies, focusing on the factors that promote success and failure. Complete comprehensive literature review on reliability enhancing mechanisms. Such research will identify:

- The conditions under which organizations are adaptable to new knowledge, new circumstances regarding risk, science, and legitimacy concerns.
- The kinds of and conditions under which certain organizational arrangements channel information about their own failures, as well as those of other organizations, so that learning, adaptability, and resilience are enhanced.
- The major forms of institutional failure and success, and how they correlate with institutional reliability and performance.

Target Status: [ ] Process/Method Exists [X] Process/Method Being Pursued [ ] No Known Process/Method

Status Justification: Failure is normal in all aspects of life, and so should be expected in all organizations, including those involved in long term stewardship projects. Furthermore, we actually *need* failures, although hopefully failures that are not extreme, for deep organizational learning. Redundancy and specialization of function are endemic in reliable organizations, although these attributes are not without their own problems. For effective long term stewardship it will be crucial for organizations to be flexible, self-reflective, and open to scrutiny from without.

Mid-term(2014) Target:

Target Description:

Target Status: [ ] Process/Method Exists [ ] Process/Method Being Pursued [ ] No Known Process/Method

Status Justification:

Long-term(2020) Target:

Target Description:

Target Status: [ ] Process/Method Exists [ ] Process/Method Being Pursued [ ] No Known Process/Method

Status Justification:

Author: Lee Clarke
February 20, 2002

Elevator 2_3 – Identify major forms or pathways of institutional failure/success in order to improve institutional reliability performance

Effective long term stewardship is a combination of technical and human achievement. Highly developed engineering and technical solutions should be accompanied by similarly developed social organizations. Irrespective of the level of development, institutional failure is inevitable. There is no such thing as error-free operation. But it may be possible to prevent single errors from cascading into larger disasters by facilitating organizational learning. Long term stewardship is enhanced to the extent that:

- Organizations are adaptable to new knowledge, new circumstances regarding risk, science, and legitimacy concerns.
- Organizations engage in appropriate learning and devise arrangements that channel information about their own failures, as well as those of other organizations.
- We understand the major forms of institutional failure and success, so that institutional reliability and performance can improve.

To achieve those general tasks we need a vigorous research program on long term stewardship and organizational reliability.

- There is no one "best way." Effective LTS will require multiple organizational arrangements, each designed for appropriate tasks.
- Multiple organizational configurations will permit flexible and speedy response to unanticipated problems.
- For some tasks decentralization of decision making authority will be appropriate. Such structures push ownership of problems down the organization, where close-to-the-problem expertise is required.
- Specialization of function among different organizational units permits problem resolution in appropriate ways.
- Organizations with appropriately permeable boundaries allow for greater participation by interested consistencies, thus increasing both the quality of solutions to problems and legitimacy with those constituencies.
- Redundant specialization is appropriate in some situations, though clearly not all. Well-designed redundancy provides backup for mission critical functions.
- Organizational units whose central purpose is the preservation and transmission of information aids robustness and sustainability.
- Flexibly specialized organizations are more adaptable to future exigencies and expectations, which can not be anticipated at present.
- Relatively open institutional structures will help maintain continued partnerships with state, local, and tribal governments.
- Effective organizational decision makers will consider scenarios if long-term stewardship fails? This is not to say it *will* fail, but that imagining it so, via ideas about worst cases, will assist in organizational learning.
- Flexible organizations with incentive structures that prize innovation and creativity will increase the range of alternatives available for consideration when problems arise.

Responsible WG Member Lee Clarke

SS&IC - LTS S&T Roadmap Target Form

Program Activity: Develop improved reliability/constancy in stewardship institutions

Technical Capability: Appropriate organizational culture, with supporting organizational structures of incentives and sanctions.

Goal: [ ] Reduce Cost [X] Reduce Uncertainty [ ] Reduce Risk

Short-term(2008) Target: Long term stewardship is incorporated into the mission of the organization, and the incentive structure supports that mission

Target Description: Complete research on the range of cultures that are present in organizations for which expectations of high reliability are extensive. Complete research on incentive structures that reward/punish creative thinking and assertive imaginations. Research sites should include surveys of organizations with the following technical core concentrations:

- control: e.g. military and other high-command systems in which high levels of constraint are necessary
- collaborative: e.g. sports teams, Congress, air traffic control and other organizations built around affiliation and compromise
- expert knowledge: e.g. universities, NASA, Manhattan Project and other organizations in which expertise is paramount
- commitment: e.g. churches, religious organizations, communes and other organizations in which commitment to ideals is the driving force

Such surveys should be combined with intensive case studies of success and failures.

Target Status: [ ] Process/Method Exists [X] Process/Method Being Pursued [ ] No Known Process/Method

Status Justification: The likelihood of effective long term stewardship is considerably diminished if the goal and function of stewardship is not seen as central to the DOE mission. Additionally, personnel need to feel free from punishment or recrimination if they bring bad news or potentially dangerous situations to management's attention. A genuine commitment to concentrate on excellent performance and resilient response to problems leads to safer operations and greater legitimacy with external constituencies. Institutional trust is cost effective in the short and the long run.

Mid-term(2014) Target:

Target Description:

Target Status: [ ] Process/Method Exists [ ] Process/Method Being Pursued [ ] No Known Process/Method

Status Justification:

Long-term(2020) Target:

Target Description:

Target Status: [ ] Process/Method Exists [ ] Process/Method Being Pursued [ ] No Known Process/Method

Status Justification:

Author: Lee Clarke
February 20, 2002

Elevator, 2.2: Appropriate organizational culture, with supporting organizational structures of incentives and sanctions.

An appropriate organizational culture, with supporting organizational structures of incentives and sanctions, must be instituted so that site personnel will think and act ways that increase safety and facilitate responsible stewardship. The spirit and the purpose of long term stewardship must be incorporated into the mission of the organization; the organizational and incentive/sanction structure should support the mission. Following are the major benefits of the proposed research:

- An organizational culture that values argument and dissent leads to more imaginative thinking about safety goals.
- Safety subcultures that specialize in creating a "safety imagination" can be developed that span across organizations.
- An organizational culture that has long term stewardship as part of its mission will communicate to everyone in the organization that human health and environmental safety are important production goals.
- Incentive structures that reward creative thinking and assertive idea-mongering, especially among personnel at "ground level," enhance constancy and flexibility.
- Creating institutional mechanisms whereby personnel can report potentially dangerous circumstances, both inside and outside a facility, that the organization has a first-level commitment to community and ecological health.
- A culture of responsible stewardship values innovative thinking about what an organization is doing right, and what it might be doing wrong.
- A culture of responsible stewardship taps the knowledge and local wisdom of all organizational members.
- A culture that places long term stewardship at the core of the organization's mission will lead to enhanced personnel morale, lower turnover, and higher commitment.
- An incentive structure that is commensurate with an organizational culture that values creativity and dissent produces thinking "outside of the box."
- An incentive structure that is appropriate to the needs of long term stewardship will send the message to personnel that they will be rewarded, rather than punished, for bringing bad news to the attention of superiors.
- A culture that stresses not only short term production goals of the organization but long term needs of the community will enhance its legitimacy.
- An organizational culture infused with values necessary for long term stewardship will prize value centered goal attainment, in addition to production goals.
- An incentive structure that prizes broad and deep points of view will help create a work environment of collaboration, cooperation, and consensus rather than one of competition and conflict.
- A culture with long term stewardship values as part of its core mission will be more flexible in the long term, more adaptable to changing needs of its constituencies, and *smarter* about what is known and not known.
- An organizational culture appropriate to long term stewardship will reduce long term costs, and short term risks and uncertainties.

Responsible WG Member Tom Leschine

SS&IC - LTS S&T Roadmap Target Form

Program Activity: Improve ability to learn from mistakes and to adopt improvements.

Technical Capability: Build in ability to reconsider options in future

Goal: ☐ Reduce Cost ☐ Reduce Uncertainty ☐ Reduce Risk

Short-term(2008) Target: Development of organizational models and of a decision process for evaluating/reconsidering end states (1 of 2)

Target Description: Part A -- Legal and regulatory structures that permit the reopening of end state considerations

Target Status: ☒ Process/Method Exists ☒ Process/Method Being Pursued ☐ No Known Process/Method

Status Justification: CERCLA provides a robust regulatory framework under which the considerations that are the subject of this section can be made. A regulatory vehicle for revisiting end states already exists, in the form of the CERCLA five-year review process. The limitations that exist appear to fall into the areas of:

- Legal interpretations regarding rights of parties to initiate reopener options
- Triggers in five-year reviews or other processes that would initiate reexamination of end states
  - A particular difficulty for which appropriate organizational models do not appear to be in use is that of assuring that routine review tasks are carried out with diligence over the long run. The current EPA five-year review process in particular has been criticized for quickly falling victim to this particular government failure, the result of budgetary pressures on EPA (NRC 2000, Ch. 7).
- Transparency in the CERCLA process sufficient to make clear the basis for the selected end state and its linkage to current remedial actions
  - Work sponsored by the CRESP program is aimed at developing geographic and web-based information technologies for use in promoting decision transparency in DOE remedial actions under CERCLA (Drew 2002).

Mid-term(2014) Target:

Target Description:

Target Status: ☐ Process/Method Exists ☐ Process/Method Being Pursued ☐ No Known Process/Method

Status Justification:

Long-term(2020) Target:

Target Description:

Target Status: ☐ Process/Method Exists ☐ Process/Method Being Pursued ☐ No Known Process/Method

Status Justification:

Responsible WG Member Tom Leschine

SS&IC - LTS S&T Roadmap Target Form

Program Activity: Improve ability to learn from mistakes and to adopt improvements.

Technical Capability: Build in ability to reconsider options in future

Goal: ☐ Reduce Cost ☐ Reduce Uncertainty ☐ Reduce Risk

Short-term(2008) Target: Development of organizational models and of a decision process for evaluating/reconsidering end states (2 of 2)

Target Description: Part B -- Organizational and decision process models for triggering and guiding reconsideration, including information and public involvement components

Target Status: [X] Process/Method Exists [X] Process/Method Being Pursued [X] No Known Process/Method

Status Justification:

- Decision processes and public participation.
  - Nearly all DOE sites have established mechanisms for public involvement, notably the site-specific advisory boards (Boiko et al. 1996). The Hanford Future Site Uses Working Group, a precursor to the Hanford Advisory Board organized in 1994, used a broad public participation process to develop a set of values and land-use designations to guide the Hanford cleanup, then in its early stages. These values became important sources of guidance when endpoints were subsequently developed for specific cleanup RODS at Hanford.
  - The specific arrangements for public participation, and to an extent the processes of decision making that DOE employs in relation to broader aspects of the cleanup, have tended to be developed on a site-by-site and ad hoc basis. Although the NRC's analytic-deliberative process model (NRC 1996) has been offered as a template for melding technical analysis with deliberative procedures for exactly the kinds of problems DOE faces at its legacy waste sites, there is little systematic research to develop methods for incorporating such procedures into cleanup decision making at the sites (Kinney and Leschine 2002).
  - As noted above, there is promising work on approaches to increase the transparency of decisions made in the cleanup of DOE sites within the CRESP Program (Drew 2002). This work nevertheless has not been developed to the stage where it can be implemented in the specific contexts of current cleanup decisions of importance to site managers and stakeholders.
- Exposure scenario development for end state selection
  - DOE currently has little capability to understand and forecast long-term demographic trends in the regions surrounding sites with potentially harmful wastes in place. Demographers have developed procedures for making 20-year and longer-term forecasts of regional population growth and demographic trends, but such capabilities have not been deployed with specific reference to DOE sites, despite the bearing that demographic change can have on the future effectiveness of long-term stewardship.
  - Michael Greenberg and associates in the CRESP program have developed capabilities that permit forecasting of regional economic trends as they are affected by DOE cleanup decisions. These provide some basis for short-term prediction, but like the situation with demographic analysis, beg the question of what monitoring of trends is put in place in communities around DOE sites. Although capabilities exist to do such "demographic" monitoring, whose purpose would be to determine whether actual trends are in line with the predictions incorporated into the exposure scenarios that guide remedy selection, this work has yet to be applied in a DOE context.
  - Remedy selection at DOE sites frequently includes both cleanup action and provision for institutional controls to protect populations from the risks that remain. As the recent "Top to Bottom Review" report of the Department indicates, the estimated performance of proposed institutional controls should be included in decisions on remedial action. Mercer and colleagues at CRESP have been developing a template for evaluating the social vulnerability of institutional controls, but this work still awaits pilot development and testing in a specific DOE context.

Mid-term(2014) Target:

Target Description:

Target Status: ☐ Process/Method Exists ☐ Process/Method Being Pursued ☐ No Known Process/Method

Status Justification:

Needed Capability: "Build in ability to reconsider options in the future."

Short-term Target: "Development of organizational models and of a decision process for evaluating/reconsidering end states."

The Elevator Speech

An *end state* can be defined as

> … the final product of a waste processing, remediation, or management scenario characterized well enough … to allow details of scenarios to be specified. In addition to chemical and physical properties, specifications of end states may include location, legal, regulatory, societal and institutional factors (NRC 1999b, p. 2).

End states for waste sites are typically arrived at through the process of "remedy selection" (aka remedial action) under CERCLA, RCRA or a combination of applicable federal and state laws (Wagner 1994). For DOE sites, DOE Order 435.1, Radioactive Waste Management, helps clarify how CERCLA, DOE orders and other regulatory requirements can be applied to achieve site closure (NRC 2000, Appendix E). The applicability of federal and state environmental laws to site cleanup decisions is often negotiated with regulatory agencies and site stakeholders, with numerous negotiated requirements taking the form of ARARS (applicable or relevant and appropriate requirements) [CERCLA Title I, Sec. 121(d)(2)]. The total package of agreed remedies for a particular waste site (or "operable unit" within a larger DOE site) constitutes a record of decision (ROD) that certifies that remedy selection was carried out in accordance with legal requirements (Wagner 1994, p. 319).

Reconsidering the end state for a DOE site requires a vehicle for re-opening consideration, a decision process for undertaking the reconsideration in concert with the parties to the original agreement, the technical and organizational means for developing and evaluating alternative end states for possible adoption and, where found necessary, the authority and a process for implementing change. Parenthetical to these requirements is articulation of the "need" for reconsideration, a factor that may figure in DOE's political ability to reconsider an end state. Numerous studies have shown that public trust and confidence problems have hindered DOE's ability to gain public acceptance of its cleanup intentions (NRC 2000, Chapt. 7).

More recently however, effective use of positive incentives by DOE is seemingly leading once recalcitrant parties to become willing to reconsider current cleanup commitments (DOE press release, March 6, 2002). In other cases the RODs for remedial actions at DOE site have been limited to *interim* actions, necessitating future reconsideration as these actions are completed and evaluated. The CERCLA 5-year review process provides a principal vehicle for DOE, EPA, and possibly even state governments to initiate reconsideration of remedies that are found to be ineffective. DOE also appears to have the means to volunteer modifications to remedies in light of new scientific and technical information.

A major criticism of the CERCLA approach is that regulatory drivers can obscure the practical significance for the remedies selected of both the end states and their supporting assumptions (Hersh et al. 1997). In the case of the larger DOE sites, the sheer complexity of the cleanup, with many different individual waste sites and operable units receiving attention in serial fashion over a protracted period of time, may necessitate reconsideration of earlier parcel remedy decisions. But the triggers for such reconsideration are unclear, as most environmental laws were not drafted with such situations in mind.

DOE's EM Program has a history of involving stakeholders and tribes in cleanup decisions, principally through site-specific advisory boards (Boiko et al. 1996). There is broad agreement that effective public involvement is key to successful remedy selection under CERCLA and similar programs (Hersh et al. 1997). Effective processes for involving stakeholders will likely be central to public acceptance of end state reconsideration that reduces cleanup requirements or that increases concern about the effectiveness of proposed institutional controls.

Technical guidance for remedy selection is typically provided through risk assessments. Although procedures vary, most risk assessments proceed along lines similar to guidance developed by EPA for the Superfund program. The exposure scenarios that frame these assessments depend heavily on assumptions about future land use (affecting both the assumed size and character of potentially exposed populations, and the nature of the pathways by which future exposure might occur). With industrial, recreational and residential exposure scenarios all currently in use in determinations of remedial-action end states at DOE sites, the process of reconsidering an end state comes down in large measure to re-opening the CERCLA decision process and revising the exposure scenario.

Industrial-use scenarios generally lead to the least waste removal or least stringent on-site waste sequestration requirements, while residential scenarios may require extensive waste removal and cleanup to levels approaching background. Institutional controls and other stewardship requirements will also vary with anticipated land use, the completeness of waste removal, and the means used to isolate residual wastes. As noted above, both the basis for selecting particular land-use scenarios and the relationship between remedy selection and land-use scenarios have been criticized for being either unclear or inconsistent when viewed across sites or through time (Hersh et al. 1997). Groundwater contamination is widespread throughout the DOE complex and the inability to remedy groundwater contamination may well emerge as the most important determinant of the land use that is ultimately supportable at many DOE sites (NRC 1999a, 2000). In many instances, scant attention has been paid to such broad-scale constraints as end states have been selected for individual waste sites (U.S. DOE 2002b).

Reconsideration of end states in the context of the land-use aspirations of communities surrounding DOE can result in situations where scientific and technical evaluations and information are seemingly set in opposition to community and other stakeholder values. The "analytic-deliberative process" (Kinney and Leschine in press, NRC 1996) has been suggested as a way of conducting risk-based evaluations in a participatory, community-influenced way. Attention to processes of public involvement is likely central to gaining public acceptance of site closure decisions that do not support unrestricted public use or access.

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Activities / Capabilities	Impact by 2008	Impact beyond 2008	Targets: Short-term (2008)	Mid-term (2014)	Long-term (2020)	Resp. WG Member
2. Develop improved reliability/constancy in LTS institutions						
2.1 sustainable and adequate funding						
G1: reduce cost	M	H				
G2: reduce technical uncertainty	**H**	H	Initial case studies finished and reviewed/synthesized by experts, with potentially promising options beginning field testing			Liz
G3: reduce risk to public and environment	**H**	H	Initial case studies finished and reviewed/synthesized by experts, with potentially promising options beginning field testing			
2.2 Appropriate organizational culture, with supporting organizational structures of incentives and sanctions.						
G1: reduce cost	N	H				
G2: reduce technical uncertainty	**H**	H	LTS is incorporated into the mission of the organization and the organizational and incentive/sanction structure supports that mission			Lee Clarke
G3: reduce risk to public and environment	M	H				
2.3 Identify major forms or pathways of inst. failure/success in order to improve inst. reliability performance						
G1: reduce cost	M	H				
G2: reduce technical uncertainty	**H**	H	Research findings reasonably well developed and the steward has begin to take them into account			Lee Clarke
G3: reduce risk to public and environment	M	H				
2.4 understand social factors that influences risk through time and assure continous "scanning" of those factors						
G1: reduce cost	N	M				
G2: reduce technical uncertainty	N	M				
G3: reduce risk to public and environment	N	H				
2.5 Ability to implement the appropriate organizational structures to adapt to range of task						
G1: reduce cost	N	M				
G2: reduce technical uncertainty	N	H				
G3: reduce risk to public and environment	N	H				
2.6 Build in stewardship and contaminate minimization to new or ongoing activities (e.g. NNSSA sites)						
G1: reduce cost	N	H				
G2: reduce technical uncertainty	N	H				
G3: reduce risk to public and environment	N	H				
3. Improve ability to learn from mistakes and to adopt improvemennts						
3.1 ongoing self-assessments, complete with appropriate Organizational performance measures and response mechanisms.						
G1: reduce cost	N	M				
G2: reduce technical uncertainty	N	M				
G3: reduce risk to public and environment	N	H				
3.2 Identify conditions under which physical and land/use controls do or don't remain effective, and why						
G1: reduce cost	N	M				
G2: reduce technical uncertainty	**H**	H	Have identified the range of potential controls and how they work.			Liz
G3: reduce risk to public and environment	M	H				

Prevent NEW contamination (e.g. NSSA sites)

3.3 Develop "early warning"/near miss tracking and response						
G1: reduce cost	N	M				
G2: reduce technical uncertainty	N	H				
G3: reduce risk to public and environment	N	H				
3.4 Build in ability to reconsider options in the future						
G1: reduce cost	**H**	H	Development of organizational models and of a decision process or model for evaluating/reconsidering end states.			Tom L.
G2: reduce technical uncertainty	N	M				
G3: reduce risk to public and environment	N	H				
3.5 Promising approaches for adaptation and improvements						
G1: reduce cost	M	H				
G2: reduce technical uncertainty	N	M				
G3: reduce risk to public and environment	N	H				
4. Document, retain and communicate information						
4.1 Identifying information needed by current and future generations						
G1: reduce cost	N	M				
G2: reduce technical uncertainty	N	H				
G3: reduce risk to public and environment	N	H				
4.2 Developing Improved Capabilities for information retention, retrieval and display						
G1: reduce cost	M	H				
G2: reduce technical uncertainty	**H**	H	DOE has an effective LTS information management system in place.			Deb
G3: reduce risk to public and environment	N	H				
4.3 Communicating information in appropriate format for various audiences						
G1: reduce cost	M	M				
G2: reduce technical uncertainty	M	M				
G3: reduce risk to public and environment	M	H				
4.4 "Context": communicating WHY we think info may be important						
G1: reduce cost	N	M				
G2: reduce technical uncertainty	M	M				
G3: reduce risk to public and environment	N	H				
5. Improve institutional credibility and community interaction						
5.1 Learning what affects public trust and confidence						
G1: reduce cost	**H**	H	Initial case studies finished, reviewed and synthesized by experts, and pilot studies underway at selected field sites.			Tom M.
G2: reduce technical uncertainty	N	M				
G3: reduce risk to public and environment	N	M				
5.2 Involving communities in research and monitoring						
G1: reduce cost	M	H				
G2: reduce technical uncertainty	M	M				
G3: reduce risk to public and environment	M	H				
5.3 Involving community in conduct of stewardship						
G1: reduce cost	M	H				
G2: reduce technical uncertainty	M	M				
G3: reduce risk to public and environment	**H**	H	Empirical identification of what forms of involvement are most effective at reducing risk, and pilot studies underway at selected sites.			Tom Marshall

4.2 what info, but also what modes of communication

4.3 "graded": What people might want what info?

4.4 Communicate at least why WE think it's important

4.5 Need improved understanding of what future audiences may "need"

4.1 (Research to) develop "template" (what's most impt? How keep? How communicate?)

Long-Term Stewardship
Science and Technology Roadmap

Decision Making and Institutional Performance

DM&IP Team

Bill Freudenburg (Chair)	**University of Wisconsin–Madison**
Lee Clarke	**Rutgers University**
Kai Erikson	**Yale University**
Deborah Griswold	**DOE Albuquerque Operations Office**
Elizabeth Hocking	**Argonne National Laboratory**
Thomas Leschine	**University of Washington**
Thomas Marshall	**Rocky Mountain Peace & Justice Center**

Process Overview

- **Pre-meeting teleconference**
- **Most members came in Saturday/Sunday**
  - Two extra meetings
- **Met with System Safety & Institutional Controls group**
  - Useful clarification; did *not* try to separate
  - Need to (and plan to) do more integration work
- **Largely new for DOE, thus many issues at early stage**
- **Still vital**
- **Biggest savings come later**
- **Today, focus on near-term risk/safety savings**

Activities

- **Develop improved reliability/constancy in LTS institutions**
- **Improve ability to learn from mistakes and to adopt improvements**
- **Document, retain and communicate information**
- **Improve institutional credibility and community interaction**

DM&IP - Activity 2

Activities / Capabilities	Impact by 2008	Impact beyond 2008	Targets: Short-term (2008)	Mid-term (2014)	Long-term (2020)
2. Develop improved reliability/constancy in LTS institutions					
2.1 sustainable and adequate funding					
G1: reduce cost	M	H			
G2: reduce technical uncertainty	**H**	H	Initial case studies finished, reviewed by experts, and potentially promising options beginning Field testing		
G3: reduce risk to public and environment	**H**	H	Initial case studies finished, reviewed by experts, and potentially promising options beginning Field testing		
2.2 Appropriate organizational culture, with supporting organizational structures of incentives and sanctions.					
G1: reduce cost	N	H			
G2: reduce technical uncertainty	**H**	H	LTS is incorporated into the mission of the organization and the organizational structure supports that mission		
G3: reduce risk to public and environment	M	H			
2.3 Identify major forms or pathways of inst. failure/success in order to improve inst. reliability performance					
G1: reduce cost	M	H			
G2: reduce technical uncertainty	**H**	H	Research findings reasonably well developed and the steward has begin to take them into account		
G3: reduce risk to public and environment	M	H			
2.4 understand social factors that influences risk through time and assure continous "scanning" of those factors					
G1: reduce cost	N	M			
G2: reduce technical uncertainty	N	M			
G3: reduce risk to public and environment	N	H			
2.5 Ability to implement the appropriate organizational structures to adapt to range of task					
G1: reduce cost	N	M			
G2: reduce technical uncertainty	N	H			
G3: reduce risk to public and environment	N	H			
2.6 Build in stewardship and contaminate minimization to new or ongoing activities (e.g. NNSSA sites)					
G1: reduce cost	N	H			
G2: reduce technical uncertainty	N	H			
G3: reduce risk to public and environment	N	H			

SS&IC - Activity 2 (cont)

- **2. Develop improved reliability/constancy in LTS institutions.**
  - 2.1 sustainable and adequate funding
    - Technical Uncertainty and Risk Targets – Initial case studies finished and reviewed/synthesized by experts, with potentially promising options beginning field testing.
  - 2.2 Appropriate organizational culture, with supporting organizational structures of incentives and sanctions.
    - Technical Uncertainty Targets – LTS is incorporated into the mission of the organization, and the organizational and incentive/sanction structures supports that mission

SS&IC - Activity 2 (cont)

Long-Term Stewardship Science and Technology Roadmap

- 2.3 Identify major forms or pathways of institutional failure/success in order to improve institutional reliability performance.
  - Technical Uncertainty Target – Research findings reasonably well-developed, and the steward has begin to take them into account.

DM&IP - Activity 3

Long-Term Stewardship Science and Technology Roadmap

Activities / Capabilities	Impact by 2008	Impact beyond 2008	Targets: Short-term (2008)	Mid-term (2014)	Long-term (2020)
3. Improve ability to learn from mistakes and to adopt improvemennts					
3.1 ongoing self-assessments, complete with appropriate Organizational performance measures and response mechanisms.					
G1: reduce cost	N	M			
G2: reduce technical uncertainty	N	M			
G3: reduce risk to public and environment	N	H			
3.2 Identify conditions under which physical and land/use controls do or don't remain effective, and why					
G1: reduce cost	N	M			
G2: reduce technical uncertainty	**H**	H	Have identified the range of controls and how they work.		
G3: reduce risk to public and environment	M	H			
3.3 Develop "early warning"/near miss tracking and response					
G1: reduce cost	N	M			
G2: reduce technical uncertainty	N	H			
G3: reduce risk to public and environment	N	H			
3.4 Build in ability to reconsider options in the future					
G1: reduce cost	**H**	H	Development of a decision process or model for evaluating/reconsidering endstate.		
G2: reduce technical uncertainty	N	M			
G3: reduce risk to public and environment	N	H			
3.5 Promising approaches for adaptation and improvements					
G1: reduce cost	M	H			
G2: reduce technical uncertainty	N	M			
G3: reduce risk to public and environment	N	H			

SS&IC - Activity 3 (cont)

- **3. Improve ability to learn from mistakes and to adopt improvements.**
  - 3.2 Identify conditions under which physical and land/use controls do or don't remain effective, and why.
    - Technical Uncertainty Target – Have identified the range of potential controls and how they work.
  - 3.4 Build in ability to reconsider options in the future.
    - Cost Target – Development of organizational models and of a decision process or model for evaluating/reconsidering end states.

DM&IP - Activity 4

Activities / Capabilities	Impact by 2008	Impact beyond 2008	Targets: Short-term (2008)	Mid-term (2014)	Long-term (2020)
4. Document, retain and communicate information					
4.1 Identifying information needed by current and future generations					
G1: reduce cost	N	M			
G2: reduce technical uncertainty	N	H			
G3: reduce risk to public and environment	N	H			
4.2 Developing Improved Capabilities for information retention, retrieval and display					
G1: reduce cost	M	H			
G2: reduce technical uncertainty	**H**	H	DOE has an effective LTS information management system.		
G3: reduce risk to public and environment	N	H			
4.3 Communicating information in appropriate format for various audiences					
G1: reduce cost	M	M			
G2: reduce technical uncertainty	M	M			
G3: reduce risk to public and environment	M	H			
4.4 "Context": communicating WHY we think info may be important					
G1: reduce cost	N	M			
G2: reduce technical uncertainty	M	M			
G3: reduce risk to public and environment	N	H			

SS&IC - Activity 4 (cont)

- **4. Document, retain and communicate information.**
  - 4.2 Developing Improved Capabilities for information retention, retrieval and display.
    - Technical Uncertainty Target – DOE has an effective LTS information management system in place.

DM&IP - Activity 5

Activities / Capabilities	Impact by 2008	Impact beyond 2008	Targets: Short-term (2008)	Mid-term (2014)	Long-term (2020)
5. Improve institutional credibility and community interaction					
5.1 Learning what affects public trust and confidence					
G1: reduce cost	**H**	H	Initial case studies finished of what engenders public trust and confidence, reviewed by experts, and pilot underway.		
G2: reduce technical uncertainty	N	M			
G3: reduce risk to public and environment	N	M			
5.2 Involving communities in research and monitoring					
G1: reduce cost	M	H			
G2: reduce technical uncertainty	M	M			
G3: reduce risk to public and environment	M	H			
5.3 Involving community in conduct of stewardship					
G1: reduce cost	M	H			
G2: reduce technical uncertainty	M	M			
G3: reduce risk to public and environment	**H**	H	Determine what constitutes effective involvement at reducing risk and pilot studies underway at selected sites.		

Roadmap Input - DM&IP

Long-Term Stewardship Science and Technology Roadmap

- **5. Improve institutional credibility and community interaction.**
  - 5.1 Learning what affects public trust and confidence.
    - Cost Target – Initial case studies finished, reviewed and synthesized by experts, and pilot studies underway at selected field sites.
  - 5.3 Involving community in conduct of stewardship.
    - Risk Target – Empirical identification of what forms of involvement most effective at reducing risk, and pilot studies underway at selected sites.